Mackenzie basin within two and a half centuries, the presumption being that they have occupied the plains for a long period, whence their want of individuality can not be explained as due to disorganization attendant to the hasty assimilation of a new culture. Sufficient comparative data have been introduced under the various headings to show the relative position of the Blackfoot in the northern plains group and, in turn, the relative position of this group in the area at large. It appears that the material culture of the northern plains tribes was relatively least influenced by the tribes of the plateaus on the west, but profoundly affected by acquisitions from the south and the east. Thus, while tradition gives the Blackfoot and Assiniboine women of former times a costume like that of the Cree and Salteaux, within the historical period they have used the well-known form of the Kiowa, Ute, Arapaho and Dakota: again, the tipi of the Blackfoot, like that of the Crow, is of the type known to some Déné tribes and also the Salteaux, in contrast with the type used by the Arapaho, Dakota, *et al.* Throughout the paper a number of problems in the distribution of cultural traits have been defined for which additional data are needed, especially from the Cree and Central Algonkin tribes.

In closing, it seems in order to state that field-work among the Cree, Salteaux, Crow, Hidatsa, Mandan and Dakota has been sufficiently advanced to announce papers upon these tribes as the next issues of the series.

Clark Wissler

THE DISCOVERY OF FOSSIL MAMMALS IN CUBA AND THEIR GREAT GEOGRAPHICAL IMPORTANCE

From the standpoint of geographical evolution there was no more important announcement at the meeting of the Geological Congress at Stockholm than that of the discovery of a large mammalian fauna in the Pleistocene caves of central Cuba, by Professor de la Torre, of the University of Havana. Hitherto the known mammals of Cuba consisted of four living and one extinct species of rodents, and one species of edentates, according to America's great naturalist, the late Professor E. D. Cope (whose conclusions were necessarily adopted by the writer as long ago as 1894). Messrs. Vaughan and Hayes, although not workers in vertebrate paleontology, in writing of Cuba discredited the occurrence of even these few fossils, as reported by other observers, and, furthermore, reported as wanting, any Jurassic formation in Cuba, although such had been found at an earlier date.

Professor de la Torre's collection embraces a large Pleistocene fauna of rodents, edentates and other vertebrates, as also excellent specimens of Jurassic fossils. Some of these were exhibited at Stockholm and others are at present at the American Museum of Natural History, New York. These Pleistocene mammals, or other immediate ancestors, must have reached the island of Cuba by land tongues, now submerged to 6,000 feet, except those by way of Florida (of which Cuba is the extension of the continental mass), which are now only 2,100 feet below sea-level. These submerged land tongues are themselves incised by cañons, which were once land features, and show the recent submergence of the whole Antillean region, which hypothesis was also accepted by Cope. The migrations of these animals confirms a late great continental elevation, which can not be ignored in any theory relating to the origin of the glacial period. From the biological point of view, these fossil remains are of extraordinary value, and Professor de la Torre is to be congratulated on his remarkable discovery.

Apropos, it may be stated that the writer has also himself obtained from a cavern near the boundary line, on the French and Dutch Island of St. Martin, the remains of *Amblyrhiza,* a Pleistocene rodent as large as a deer; notice of which has not hitherto been published. This rodent reached the northeastern Antilles from South America (Cope) by land tongues between the islands, now submerged, in one case to 4,000 feet.

The physiographic evidence of a similar late great elevation of Europe, based upon now submerged cañons, has also been shown by

Professor Edward Hull, of England, and Dr. Fridjof Nansen, of Norway.

J. W. SPENCER

STOCKHOLM,
August 24, 1910

SPECIAL ARTICLES

THE PERMEABILITY AND CYTOLYSIS OF EGGS

THE question as to whether cells may change in their permeability to various substances and the bearing of these changes on vital phenomena, in particular the development of the egg, has excited much discussion of late. My own experiments (at Tortugas and Woods Hole) have been directed toward determining the permeability of sea-urchin's eggs for some one substance and the effect of certain substances in altering the permeability of the egg for this substance. Sodium hydrate was chosen for the purpose because its entrance may readily be indicated after staining the cells in neutral red. This dye, red in neutral and acid solution, becomes yellow in alkaline solution.

Since the classic researches of Pfeffer it has been well known that plant cells will take up and concentrate in their sap vacuoles, certain dyes, notably methylene blue, from very dilute solutions. In some cells the dye is precipitated as fine blue granules which Pfeffer proved to be a compound formed with tannic acid. In the leaf cells of *Elodea* the dye remains in solution yet becomes more concentrated than without. This gives the appearance of a diffusion of the dye into the cell against a concentration gradient, which is of course an impossibility. The dye must be changed within, but "the precise character of the still soluble combination in which pigment accumulates in the cell sap of *Trianea, Lemna, Elodea,* etc., is as yet unknown."[1] A clue as to the nature of the condition in which the dye exists in the cell is obtained by staining with neutral red. In tap water a dilute solution is brick red, indicating that a small amount of the dye is present in the alkaline yellow condition, the undissociated molecule (ROH), on the theory of indicators. But in the *Elodea* cells it is always bright red in color. This suggested that within the cells the neutral red existed in the acid or dissociated (RCl) condition which was unable to pass out. That this view is correct can be easily shown by placing *Elodea* leaves in tap water containing neutral red plus just enough acid to convert all the dye into the acid condition without injuring the cells themselves. Not a cell stains. Thus the protoplasts "select" only the undissociated molecules of basic dyes from a solution. Within the cell these are practically completely dissociated and unable to pass out, giving the appearance of diffusion against a concentration gradient. Exactly the same conditions hold for methylene blue, only there is no difference in the color of the dissociated and undissociated elements.

Sea-urchin eggs are also capable of concentrating neutral red from very dilute solutions, but the manner of retaining the dye is very different, although the conditions of entrance are the same. No neutral red can enter sea-urchin eggs from dilute acid sea water in concentrations which do not coagulate the egg. As soon as the eggs do coagulate they stain but in a different manner from the normal eggs. In the latter the dye is taken up (combined?) by granules distinguishable from the yolk granules, in that they always pass to the distal pole of the egg on centrifuging, whether first stained and then centrifuged or first centrifuged and then stained. They are present in the fertilized as well as the unfertilized egg (*Toxopneustes*), but the rate of staining of these granules is much more rapid in the former than the latter. I would attribute this to the rate of entrance of the dye and can therefore confirm for neutral red what Lyon has recently found for methylene blue.

If red-stained sea-urchin eggs are placed in hyperalkaline (100 c.c. sea water + 1.3 c.c. $n/10$ NaOH) sea water they retain their red color for several hours. When killed by chloroform-saturated sea water, the alkali almost instantly enters and turns the red to yellow. It may be shown that the color change is independent of the swelling of the egg caused by chloroform, for the penetration

[1] Pfeffer's "Plant Physiology," Vol. I., p. 94, 1900.